



STAGENET INFRASTRUCTURE SERVICES 2006

DCN SELECTION REPORT

Prepared by:

Dirk Huggett
Version 1.1 Final
December 31, 2005

TABLE OF CONTENTS

1.	INTRODUCTION AND BACKGROUND	3
1.1.	RFP Background and STAGENet 2006	3
1.2.	STAGENET 2006 BACKBONE REQUIREMENTS	3
1.3.	STAGENET 2006 NETWORK ACCESS REQUIREMENTS	3
1.4.	STAGENET 2006 INTERNET ACCESS REQUIREMENTS	3
2.	OVERVIEW OF PROPOSALS	4
2.1.	RFP Base Proposal:	4
2.1.1.	Backbone Network.....	4
2.1.2.	Tail Circuits	5
2.1.3.	Solution Analysis	5
2.2.	RENEGOTIATE CURRENT SERVICES	5
2.2.1.	Backbone Network.....	5
2.2.2.	Tail Circuits	5
2.2.3.	Solution Analysis	5
2.3.	Negotiated Proposal:	6
2.3.1.	Backbone Network.....	6
2.3.2.	Tail Circuits	7
2.3.3.	Solution Analysis	7
2.4.	SECTION B: NETWORK ACCESS PROPOSAL	8
3.	Appendix A	10

1. INTRODUCTION AND BACKGROUND

1.1. RFP Background and STAGEnet 2006

Currently Dakota Carrier Network (DCN) provides both backbone and network access for the statewide network called STAGEnet (Statewide Technology Access for Government and Education). This network provides wide area network services and internet access for State government agencies, political sub-divisions, higher education, and K12 schools.

Current contracts are set to expire in June 2006. The State has developed a 7 – 10 year vision for the telecommunications infrastructure that is expected to not only meet, but exceed current requirements and expectations, as well as remain flexible and provide the necessary scalability required for the years to come. E-rate and outdated market pricing are two important factors driving this procurement effort and the State has taken this opportunity to expand the State's telecom capabilities to include high-speed access to the major centers in the state as well as anytime/anywhere connectivity statewide.

STAGEnet 2006 is the next generation network that envisions a cost-effective and reliable infrastructure addressing such goals as a) increased bandwidth, b) low network latency, c) reliable and survivable service, d) security and privacy, and e) low-cost network access, providing the scale and flexibility to support the convergence of voice, video and data technologies as key components in optimizing statewide services.

On July 8, 2005 the Information Technology Department released the STAGEnet 2006 Transport Services RFP soliciting proposals for three primary telecommunications service areas:

- a) Backbone services to connect eight to ten major node locations throughout the State of North Dakota
- b) Network Access to provide end-point connectivity to more than 500 sites statewide
- c) Internet Access serving State and local government agencies, higher education, K-12 school system.

1.2. STAGENET 2006 BACKBONE REQUIREMENTS

The STAGEnet 2006 Backbone must be a technology-enabling platform allowing for growth of both current applications and the addition of sites, while providing for future service connectivity enhancements without network re-design. The State requested solutions for an 8 node, leased wavelength backbone with at least one initial 2.5 Gigabit wavelength and future growth of additional wavelengths. Managed Services solutions were allowed as alternative solutions. The requested Backbone nodes were as follows: Bismarck, Jamestown, Fargo, Grand Forks, Devils Lake, Minot, Williston and Dickinson. Tail circuits are requested for Mayville, Valley City, Wahpeton and Bottineau.

1.3. STAGENET 2006 NETWORK ACCESS REQUIREMENTS

The RFP requested a two-tiered (urban and rural), flat-rate pricing structure allowing for unlimited usage for network access circuits. All current locations were defined in the RFP and pricing was requested for ATM and Point to Point T-1, DS3, OC3, and OC12 circuits. Also pricing was requested for Education Distance Learning Services (EDLS), which includes the necessary customer premise equipment to provide data and video connectivity to the end user.

1.4. STAGENET 2006 INTERNET ACCESS REQUIREMENTS

The selection criterion for this area was defined in detail in the Final Transport Selection document. This document will focus on the Backbone & Network Access portion of the RFP.

2.OVERVIEW OF PROPOSALS

Dakota Carrier Network (DCN) was the only respondent to the Backbone and Network Access Services portion of the RFP. Consequently, a clarification meeting was held on Monday August 22 to review the DCN proposal and ask for clarification regarding the Backbone and Network Access Services that DCN proposed. On August 25 an Alternate Procurement Form was executed by ITD and submitted to Procurement Division of OMB for approval to proceed to direct negotiations with DCN on Backbone and Network Access Services.

DCN responded to the base proposal for Backbone Services, and offered an Alternative Backbone Service. The state could also negotiate to just continue the current service offering.

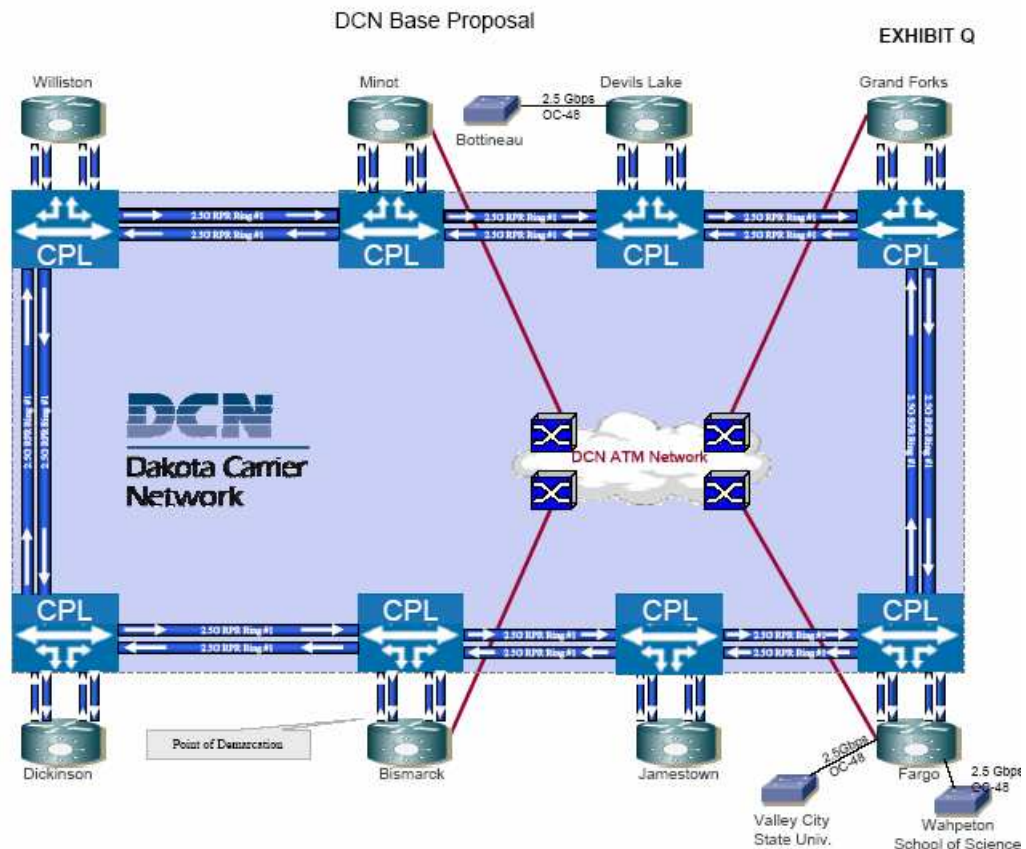
2.1. RFP Base Proposal:

2.1.1. Backbone Network

The solution requested in the RFP is comprised of a 2.5-Gbps OC-48 fiber optic connection interfaced with the DCN ATM backbone network. The Basic Service would be connected using a Dense Wave Division Multiplexing (DWDM) infrastructure which will be routed on two fiber optic rings that are fully redundant and diversely routed. DCN offered a 2.5-Gbps OC-48 segments for the core of the STAGEnet network. DCN's next generation DWDM infrastructure will be utilized to create a dedicated fiber optic infrastructure for the state network.

Extensions off the backbone nodes are made using 2.5-Gbps circuits. Dual paths are necessary to retain the redundancy criteria. Each segment has been priced as a 2.5-Gbps OC-48 connection. All backbone segments are capable of growing up to 10-Gbps as required.

The following map depicts DCN's base backbone proposal:



DCN's proposal took exception to the RFP in the following areas:

- The criteria that no two segments of the network may share the same fiber path cannot be met with for all segments listed in the Backbone Pricing Matrix. (The intended design would have been an either link selection rather than both for some cross sections which is why they voiced this concern.)
- Grand Forks. Equipment space is not available at the DCN POP location.
- Devils Lake. Equipment space is not available at the DCN POP location.
- Dickinson. Equipment space is not available at the DCN POP location.

2.1.2. Tail Circuits

DCN proposed 2.5-Gbps OC-48 connections from the STAGEnet backbone nodes to the proposed locations when available. Dark fiber and/or wavelength services are not available at these locations. These circuits are on a linear basis on fiber optic facilities.

Wavelength services are not available at all Tail Circuit locations. Circuits that are excluded from the proposal are: 1. Fargo – Mayville; 2. Grand Forks -- Mayville; 3. Minot – Bottineau and 4. Jamestown – Valley City. Pricing for the proposed circuits assumes a single 2.5-Gbps circuit. Selected locations may initially be served more economically with a 155 Mbps circuit and upgraded as warranted by the usage.

The cost of these segments was higher than the State could afford.

2.1.3. Solution Analysis

- This is the preferred design.
- The pricing of the proposal significantly exceeded the state's ability to afford this service.
- State will need to fund a fiber circuit between UND and the DCN facilities in East Grand Forks in order to get the Grand Forks Hub.
- DCN feels the Alternate proposal (found below) is more likely to be sold commercially thereby encouraging economic development.
- Provides better scalability as the whole 10-Gbps lightwave would be available. The state would just have to change out some hardware.

2.2. *RENEGOTIATE CURRENT SERVICES*

There was the option to renegotiate for just the services that are currently being provided.

2.2.1. Backbone Network

Currently there are multiple OC3 links between Bismarck and Fargo. These links are limited to 155Mbps for bandwidth. Each hub has a Sprint access point for Internet.

2.2.2. Tail Circuits

All connections outside of the two hub cities are delivered using an ATM structure provided by DCN. Realtime applications such as Video and VOIP has to run through one of the hubs to get to another site, even if the other site is in the same city. ITD is concerned about the load levels of the current hub infrastructure, especially in case of a failover situation. Any maintenance performed on one of the hubs will take ½ of the state off-line.

2.2.3. Solution Analysis

- Based upon discussions with DCN, the state would likely have seen about a 6% increase in costs.

DCN Selection Report

- The current infrastructure processing capacity is near maximum. To stay with this base structure there would need to be an investment into updating and adding equipment by the state.
- The current link between Grand Forks and Fargo has maxed out the bandwidth. UND and other Grand Forks entities would be stuck the current bandwidth. Grand Forks holds one of the university system's key data centers and hosts the student administration portion of ConnectND. There could be limitations on what other system software could be deployed at that location.
- We have never been able to achieve the capacity of our Internet connection due to bottlenecks. Maintaining this infrastructure would continue those bottlenecks.
- This is the least preferred solution.

2.3. *Negotiated Proposal:*

DCN proposed a Managed Ethernet Service for the backbone of the STAGEnet network as an alternative to the base proposal. DCN's next generation DWDM/MSPP infrastructure would be utilized to create a dedicated Resilient Packet Ring (RPR) for the state network. The RPR network combines the ring features of SONET with the flexibility of Ethernet to provide high reliability and versatility in a scalable service.

Pricing for this service is based on a per port charge and is not a function of the bandwidth that must be provided on the DCN RPR Backbone network.

It would be feasible to create separately managed and isolated networks for different applications. For example, Higher Education, K-12 Schools, State Government, etc. The segmentation of applications would ensure security and privacy for the various groups and agencies, and provides a scalable design.

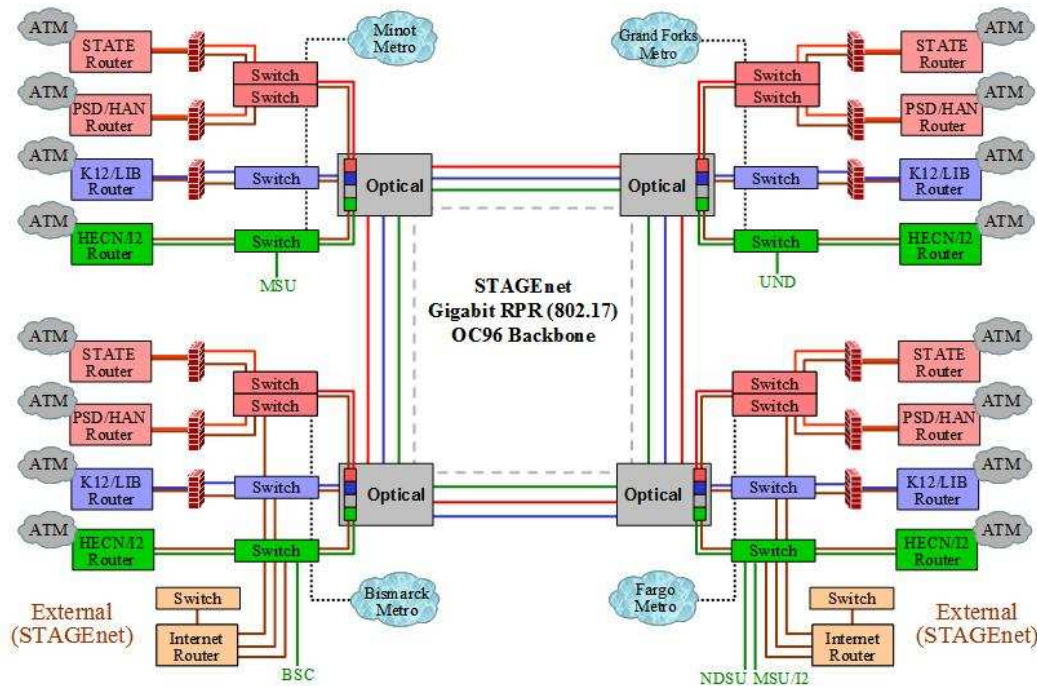
2.3.1. Backbone Network

The Backbone transport network is provided as Managed Ethernet Services. The new DCN infrastructure is designed using a Nortel DWDM system initially capable of growing to 72 wavelengths. Integrated into the DWDM system is MSPP equipment that allows DCN to carry the current SONET and ATM systems as well as establish Ethernet or RPR networks.

The negotiated solution provides a port connection to the DCN Ethernet network at each selected STAGEnet node. This connection is expected to be four 1-Gbps ports while having full access to the RPR rings capable of handling up to 10-Gbps. Expansion to the full bandwidth would just require adding additional 1-Gbps ports as needed.

The following diagram depicts the negotiated proposal:

STAGEnet 2006 Transport Backbone



It is anticipated that a single 1-Gbps Ethernet circuit would be required to replace the multiple OC3 backbone circuits currently in use.

2.3.2. Tail Circuits

Details on the tail circuits and their connecting hub points can be found as Appendix A and are based upon the proposed contract details.

2.3.3. Solution Analysis

- This design does not provide as much flexibility as the base proposal; however, DCN is willing to give ITD authority to perform provisioning themselves on the core network.
- The state will need to fund a fiber circuit between UND and the DCN facilities in East Grand Forks in order to get the Grand Forks Hub.
- Scalability will increase costs vs. lightwave solution as each expansion would cost the fee of an additional 1-Gbps port per hub location.
- The four 1-Gbps ports will be available at a lower capital expense for the state at each proposed backbone node locations.
- DCN would own, manage and maintain all of the transport equipment at the backbone nodes. This would eliminate maintenance costs such as maintaining spares and travel time, as well as the cost of Technical Support contracts.
- Increased bandwidth – Currently the state has about 300-Mbps in bandwidth across the backbone. This solution brings us up to 4-Gbps; an increase of about 12 times.
- Improved provisioning – This solution will allow the state to manage the provisioning as needed within the RPR ring provided to us. This eliminates the delays & costs in requesting those changes from DCN.
- Expanded backbone – Adding Grand Forks and Minot will not only improve service in those cities, but also shorten the amount of time it takes for the other nearby

connections to reach the high-speed backbone. This design gives the four core cities the equivalent of a Local Area Network (LAN).

- Expansion of Core – The solution provides the ability to expand the core system from the currently proposed 4 cities to other major cities as needed and funding becomes available.
- Economic Development – DCN felt this model was the one they could best offer to other customers. Therefore with the state again being the anchor tenet for a service solution, they could afford to offer the same service to other entities around the state improving the “connectability” of the state.
- The three primary research universities will be on the backbone and will have a significant increase of bandwidth available to them at a cost significantly lower than providing the same bandwidth levels under the current structure.
- Opens up opportunities for hub area K-12 schools and the K-12 schools serviced by the Great Western Network to have more participation on I2.
- Improved security – better network isolation due to channel traffic into 4 physically separate networks.
- Next generation technology allows us to do things not possible before.

2.4. SECTION B: NETWORK ACCESS PROPOSAL

DCN was the only respondent to the Network Access portion of the RFP. DCN is the current provider of access services, and has met the requirements of the RFP. DCN provided a pricing structure that represents an approximate 15% increase in access circuit fees for the state. Network access is provided either through DCN’s ATM network, or through point-to-point circuits. The following is a brief description of DCN’s ATM Backbone Network.

DCN’s ATM Backbone Network

DCN has established a cell switching network by placing ATM switches to serve the LEC owners and other customers with data switching and Internet transport services. ATM switches are in place at Bismarck, Fargo, Grand Forks and Minot.

Virtual ATM POP’s are designated at Devils Lake, Dickinson, Jamestown, Valley City and Williston. The Backbone network serves as the connection to the Edge Switch devices that are placed in the locations having fewer circuit requirements.

At the heart of the Backbone are Core Switches located in Bismarck, Fargo and Grand

Forks and have OC-3 connections to the other two Core Switches. Each of the remaining Edge Switches at these locations is connected to Core Switches via dual OC3 connections. The Edge Switch located at Minot is connected via dual DS3s. Other Edge switches will be placed at Devils Lake, Dickinson, Jamestown and Williston when warranted.

The DCN ATM network was installed beginning in mid 2000. The ATM network serves the businesses and communities throughout North Dakota as well as the North Dakota State Network requirement. This shared network creates a larger homogeneous network with the ability to guarantee service levels and reliability.

The following map depicts DCN’s ATM network:

DCN ATM Network Plus LEC Edge Switches

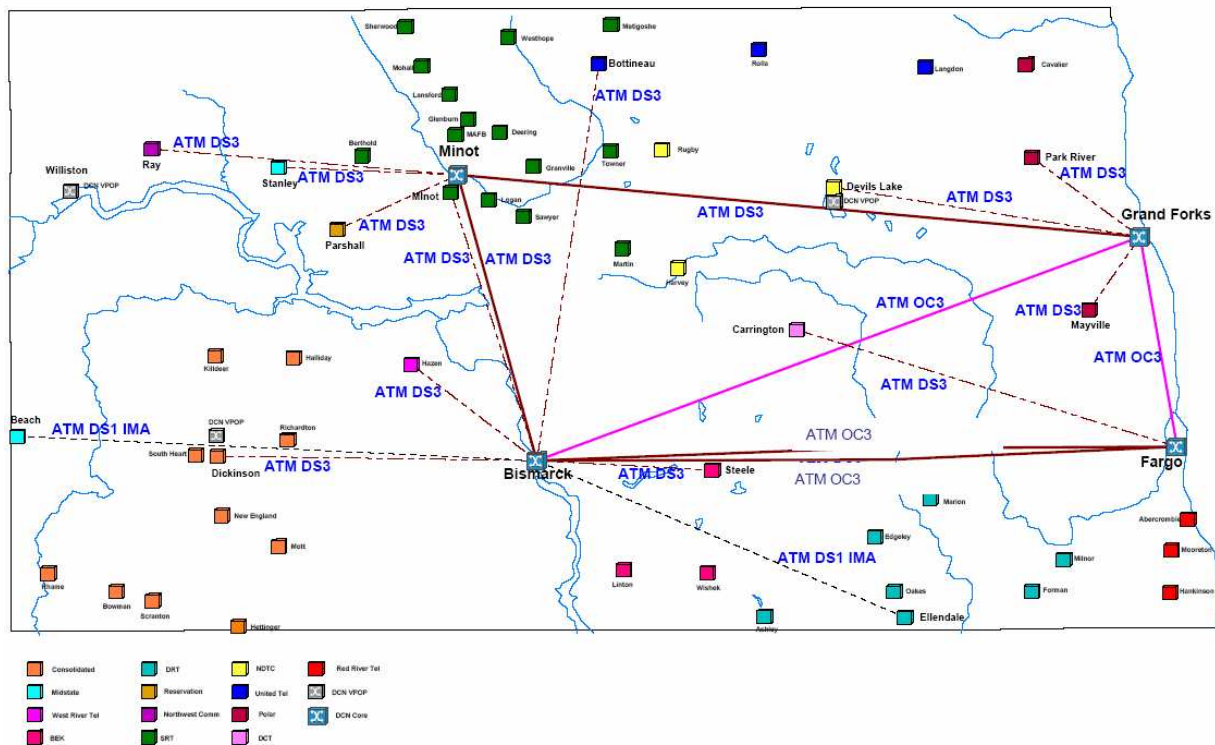


EXHIBIT C

3. SUMMARY AND RECOMMENDATIONS

3.1. *Backbone Services:*

In general, it was disappointing that there was no competition to moderate the prices more. However, the negotiated solution clearly gives the state the ability to advance the network into the next generation solution at only a moderate price increase. It provides expandability both between of the four currently proposed hubs and also to other possible hub sites. This provided a significant amount of flexibility for the state to deliver as agency, K-12 and Higher Ed needs change.

3.2. *Network Access Services:*

Again, the lack of competition to keep the price changes moderate was disappointing. However, we have no concerns about the service levels that DCN can provide and are confident that STAGEnet will remain the envy of many rural states.

4.APPENDIX A

Urban/Rural-Tier Table for Point to Point and ATM T1 service

City	Tier I (Urban)	Tier II (Rural)	DCN Designated Node
Adams		X	East Grand Forks
Alexander		X	Bismarck
Almont		X	Bismarck
Amidon		X	Bismarck
Anamoose		X	East Grand Forks
Aneta		X	East Grand Forks
Arvilla		X	East Grand Forks
Ashley		X	Bismarck
Beach		X	Bismarck
Belcourt		X	Bismarck
Belfield		X	Bismarck
Berthold		X	Minot
Beulah		X	Bismarck
Binford		X	Fargo
Bisbee		X	East Grand Forks
Bismarck	X		Bismarck
Bottineau		X	Bismarck
Bowbells		X	Minot
Bowman		X	Bismarck
Buffalo		X	Fargo
Burlington		X	Minot
Buxton		X	East Grand Forks
Calvin		X	East Grand Forks
Cando		X	East Grand Forks
Cannon Ball		X	Bismarck
Carrington		X	Fargo
Carson		X	Bismarck
Casselton		X	Fargo
Cavalier		X	East Grand Forks
Center		X	Bismarck
Cooperstown		X	Fargo
Courtenay		X	Fargo
Crosby		X	Minot
Des Lacs		X	Minot
Devils Lake	X		East Grand Forks
Dickinson	X		Bismarck
Dodge		X	Bismarck
Drake		X	East Grand Forks
Drayton		X	East Grand Forks
Dunseith		X	Bismarck
Eckelson		X	Fargo
Edgeley		X	Bismarck
Edinburg		X	East Grand Forks
Edmore		X	East Grand Forks
Elgin		X	Bismarck
Ellendale		X	Bismarck

Appendix A – Tail Circuit Nodes

City	Tier I (Urban)	Tier II (Rural)	DCN Designated Node
Emerado		X	East Grand Forks
Enderlin		X	Fargo
Epping		X	Bismarck
Fargo	X		Fargo
Fessenden		X	East Grand Forks
Finley		X	Fargo
Flasher		X	Bismarck
Fordville		X	East Grand Forks
Forman		X	Bismarck
Fort Ransom		X	Bismarck
Fort Totten		X	East Grand Forks
Fort Yates		X	Bismarck
Gackle		X	Fargo
Garrison		X	Minot
GF Air Base		X	East Grand Forks
Gilby		X	East Grand Forks
Glen Ullin		X	Bismarck
Glenburn		X	Minot
Glenfield		X	Fargo
Golva		X	Bismarck
Goodrich		X	Bismarck
Grafton		X	East Grand Forks
Grand Forks	X		East Grand Forks
Granville		X	Minot
Grenora		X	Minot
Halliday		X	Bismarck
Harvey		X	East Grand Forks
Hatton		X	East Grand Forks
Hazelton		X	Bismarck
Hazen		X	Bismarck
Hebron		X	Bismarck
Hettinger		X	Bismarck
Hillsboro		X	East Grand Forks
Hope		X	Fargo
Hunter		X	East Grand Forks
Hurdsfield		X	Fargo
Inkster		X	East Grand Forks
Jamestown	X		Bismarck
Joliette		X	East Grand Forks
Kenmare		X	Minot
Kensal		X	Fargo
Killdeer		X	Bismarck
Kindred		X	Fargo
Kulm		X	Bismarck
Lakota		X	East Grand Forks
LaMoure		X	Bismarck
Langdon		X	Bismarck
Lankin		X	East Grand Forks
Lansford		X	Minot
Larimore		X	East Grand Forks
Leeds		X	East Grand Forks
Lidgerwood		X	Fargo

Appendix A – Tail Circuit Nodes

City	Tier I (Urban)	Tier II (Rural)	DCN Designated Node
Lignite		X	Minot
Linton		X	Bismarck
Lisbon		X	Bismarck
Litchville		X	Bismarck
Maddock		X	East Grand Forks
Makoti		X	Minot
Mandan		X	Bismarck
Mandaree		X	Minot
Manning		X	Bismarck
Manvel		X	East Grand Forks
Marion		X	Bismarck
Max		X	Minot
Mayville		X	East Grand Forks
McClusky		X	Bismarck
McLaughlin SD		X	Bismarck
McVile		X	East Grand Forks
Medora		X	Bismarck
Menoken		X	Bismarck
Michigan		X	East Grand Forks
Minnewaukan		X	East Grand Forks
Minot	X		Minot
Minto		X	East Grand Forks
Mohall		X	Minot
Montpelier		X	Fargo
Mott		X	Bismarck
Munich		X	Bismarck
Napoleon		X	Bismarck
New England		X	Bismarck
New Rockford		X	East Grand Forks
New Salem		X	Bismarck
New Town		X	Minot
Newburg		X	Minot
Northwood		X	East Grand Forks
Oakes		X	Bismarck
Oberon		X	East Grand Forks
Oriska		X	Fargo
Page		X	Fargo
Park River		X	East Grand Forks
Parshall		X	Minot
Pekin		X	East Grand Forks
Pembina		X	East Grand Forks
Petersburg		X	East Grand Forks
Pettibone		X	Bismarck
Pick City		X	Bismarck
Pingree		X	Bismarck
Plaza		X	Minot
Powers Lake		X	Bismarck
Ray		X	Bismarck
Rhame		X	Bismarck
Richardton		X	Bismarck
Riverdale		X	Bismarck
Robinson		X	Bismarck

Appendix A – Tail Circuit Nodes

City	Tier I (Urban)	Tier II (Rural)	DCN Designated Node
Rock Lake		X	East Grand Forks
Rogers		X	Fargo
Rolette		X	Bismarck
Rolla		X	Bismarck
Rugby		X	East Grand Forks
Sawyer		X	Minot
Selfridge		X	Bismarck
Sherwood		X	Minot
Sheyenne		X	East Grand Forks
Solen		X	Bismarck
South Heart		X	Bismarck
St Anthony		X	Bismarck
Stanley		X	Minot
Stanton		X	Bismarck
Starkweather		X	East Grand Forks
Steele		X	Bismarck
Strasburg		X	Bismarck
Streeter		X	Fargo
Surrey		X	Minot
Sykeston		X	Fargo
Tappen		X	Bismarck
Taylor		X	Bismarck
Thompson		X	East Grand Forks
Tioga		X	Bismarck
Tower City		X	Fargo
Towner		X	Minot
Trenton		X	Bismarck
Turtle Lake		X	Bismarck
Underwood		X	Bismarck
Valley City		X	Bismarck
Velva		X	East Grand Forks
Wahpeton		X	Fargo
Warwick		X	East Grand Forks
Washburn		X	Bismarck
Watford City		X	Bismarck
West Fargo	X		Fargo
Westhope		X	Minot
White Shield		X	Minot
Wildrose		X	Bismarck
Williston	X		Bismarck
Wimbledon		X	Fargo
Wishek		X	Bismarck
Wolford		X	East Grand Forks
Wyndmere		X	Fargo
Zeeland		X	Bismarck

Routing Table for Higher Ed Locations

Location	City	DCN Designated Node
Minot State University - Bottineau Campus	Bottineau	Bismarck
Dickinson State University	Dickinson	Bismarck
Lake Region State College	Devils Lake	East Grand Forks
Mayville State University	Mayville	East Grand Forks
Minot State University	Minot	Minot
North Dakota State College of Science	Wahpeton	Fargo
North Dakota State University	Fargo	Fargo
University of North Dakota	Grand Forks	East Grand Forks
Valley City State University	Valley City	Fargo
Williston State College	Williston	Minot